**Phenol removal in constructed wetlands with oxygenation systems**

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**ABSTRACT**

Hydrocarbon contamination is considered a serious concern for the environment and is becoming prevalent across the globe due to their extensive use. Among the various hydrocarbons, phenolic compounds derived from industrial, agricultural and domestic activities exist into water bodies [1]. Constructed Wetlands (CWs) have been used to treat phenol contaminated waters since they offer numerous advantages [2].

Three horizontal subsurface flow (HSF) CWs were designed and constructed for the treatment of phenol; a control CW (CW1), a CW with the direct oxygenation by air ultra fine bubbles delivered via a porous pipe distributor (CW2). and a CW with electrochemical production of oxygen nanobubbles generated in situ (with stainless steel electrodes) (CW3). The helophyte *Juncus acutus* L. was planted in every CW. The CWs had a constant water level (~25 L) and they operated in a continuous mode with complete recirculation with the use of external 60 L-tanks containing the contaminated water. During the experimental period, several cycles were performed where the hydraulic residence time (HRT), the initial phenol mass in the system and the total volume of the system changed. At each cycle, pH, ORP, DO, temperature and phenol concentration in the CWs were monitored as well as in the external tanks.

Results showed that CW2 (with ultra fine bubbles) exhibits the best performance compared to the other two CWs. At a HRT of 16 h, CW2 completely removed the phenol after 3 days while the phenol removal after 4 days was 93.5% and 65% in CW3 and CW1, respectively. At HRT of 24 h, CW2 removed all phenol after 3 days, however, CW1 and CW3 removed all phenol by day 4.

**KEYWORDS:** Constructed wetlands, phenol removal, air-nanobubbles, electrolysis

**REFERENCES**

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